

THAT WHICH IS CLAIMED IS:

1. A formable, bright metallized laminate,  
comprising:

a formable clear coat film;

5 a first discontinuous layer of metal islands  
deposited on said formable clear coat film; and

a second discontinuous layer of metal islands,  
wherein said first discontinuous layer of metal islands  
is positioned between said formable clear coat film and  
10 said second discontinuous layer of metal islands.

2. A metallized laminate according to Claim 1,  
wherein said formable clear coat film has a  
microscopically-smooth surface.

15 3. A metallized laminate according to Claim 2,  
wherein the microscopically-smooth surface of said  
formable clear coat film has a roughness average of less  
than about 0.75 micron.

20 4. A metallized laminate according to Claim 1,  
wherein said formable clear coat film is a tinted clear  
coat film.

25 5. A metallized laminate according to Claim 1,  
wherein said formable clear coat film has a design.

6. A metallized laminate according to Claim 1, wherein said formable clear coat film comprises polyvinyl fluoride.

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7. A metallized laminate according to Claim 1, wherein said formable clear coat film comprises polyvinylidene difluoride.

10 8. A metallized laminate according to Claim 1, wherein said formable clear coat film is a polymeric composition selected from the group consisting of fluoropolymers, acrylic polymers, polyurethanes, ionomers, polycarbonates, polyolefins, polyethylene glycol-modified polyesters, polyamide polymers, and copolymers, blends, and alloys that include these  
15 polymeric compositions.

20 9. A metallized laminate according to Claim 1, wherein said formable clear coat film comprises between about 10 and 70 weight percent of an acrylic polymer and between about 30 and 90 weight percent of a fluoropolymer.

10. A metallized laminate according to Claim 9,  
wherein said formable clear coat film comprises between  
about 30 and 50 weight percent of an acrylic polymer and  
between about 50 and 70 weight percent of a fluoropolymer  
5 comprising polyvinylidene difluoride.

11. A metallized laminate according to Claim 1,  
said first discontinuous metal layer having a first  
surface that is contiguous to said formable clear coat  
10 film, and a second surface that is contiguous to said  
second discontinuous metal layer, wherein said second  
surface of said first metal layer includes a microscopic  
transitional sub-layer.

12. A metallized laminate according to Claim 11,  
wherein said microscopic transitional sub-layer is a  
15 plasma-treated sub-layer.

13. A metallized laminate according to Claim 11,  
wherein said microscopic transitional sub-layer is a  
20 deposited metal oxide sub-layer.

14. A metallized laminate according to Claim 13,  
wherein the composition of said microscopic transitional  
25 metal oxide sub-layer is an oxide of the kind of metal  
that forms said first discontinuous layer of metal  
islands.

15. A metallized laminate according to Claim 13,  
wherein the composition of said microscopic transitional  
metal oxide sub-layer is an oxide of a metal that is  
different from the kind of metal that forms said first  
discontinuous layer of metal islands.

16. A metallized laminate according to Claim 1,  
wherein said first discontinuous metal layer is selected  
from the group consisting of indium, tin, and alloys and  
blends thereof.

17. A metallized laminate according to Claim 1,  
wherein said first discontinuous metal layer and said  
second discontinuous metal layer are selected from the  
group consisting of aluminum, cadmium, cobalt, copper,  
chromium, gallium, gold, indium, iron, nichrome, nickel,  
palladium, platinum, rhodium, stainless steel, tin, zinc,  
and alloys and blends containing these metals.

18. A metallized laminate according to Claim 1,  
wherein said second discontinuous metal layer has the  
same composition as said first discontinuous metal layer.

19. A metallized laminate according to Claim 1,  
wherein said second discontinuous metal layer has a  
different composition from said first discontinuous metal  
layer.

20. A metallized laminate according to Claim 1, wherein said second discontinuous metal layer comprises metal islands having an average width of less than about 400 nm.

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21. A metallized laminate according to Claim 1, wherein said second discontinuous metal layer comprises metal islands having an average width of less than about 200 nm.

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22. A metallized laminate according to Claim 1, wherein said second discontinuous metal layer comprises metal islands having an average width of less than about 100 nm.

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23. A metallized laminate according to Claim 1, further comprising at least one additional discontinuous layer of metal islands positioned between said first discontinuous metal layer and said second discontinuous metal layer.

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24. A metallized laminate according to Claim 23, wherein:

the discontinuous metal layers are contiguous; and

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said first discontinuous metal layer and each said additional discontinuous metal layer have a first surface that is nearer the formable clear coat film and a second surface that is opposite the formable clear coat film,

wherein each said second surface comprises a microscopic transitional sub-layer.

5           25. A metallized laminate according to Claim 1,  
further comprising an adhesive layer positioned on said  
second discontinuous metal layer, opposite said first  
discontinuous metal layer.

10           26. A metallized laminate according to Claim 25,  
wherein said adhesive layer comprises a pressure-  
sensitive adhesive.

15           27. A metallized laminate according to Claim 25,  
wherein said adhesive layer comprises a heat-reactive  
adhesive.

20           28. A metallized laminate according to Claim 25,  
wherein said adhesive layer comprises a crosslinking  
adhesive system.

25           29. A metallized laminate according to Claim 25,  
wherein said adhesive layer comprises a multicomponent  
adhesive.

30           30. A metallized laminate according to Claim 25,  
wherein said adhesive layer comprises polyurethane.

31. A metallized laminate according to Claim 25,  
wherein said adhesive layer comprises acrylic.

5 32. A metallized laminate according to Claim 25,  
wherein:

said adhesive layer comprises a polyurethane layer  
and an acrylic layer; and

10 said polyurethane layer of said adhesive layer is  
positioned between said second discontinuous metal layer  
and said acrylic layer of said adhesive layer.

33. A metallized laminate according to Claim 25,  
wherein:

15 said adhesive layer comprises a polyurethane layer,  
an acrylic layer, and a chlorinated polyolefin layer;

said polyurethane layer is positioned between said  
second discontinuous metal layer and said acrylic layer;  
and

20 said acrylic layer is positioned between said  
polyurethane layer and said chlorinated polyolefin layer.

34. A metallized laminate according to Claim 25,  
wherein:

25 said adhesive layer comprises a layer made of an  
acrylic/polyurethane blend, and a chlorinated polyolefin  
layer; and

said acrylic/polyurethane layer is positioned between said second discontinuous metal layer and said chlorinated polyolefin layer.

5           35. A metallized laminate according to Claim 25, further comprising a thermoplastic backing layer placed on said adhesive layer.

10           36. A metallized laminate according to Claim 35, wherein said thermoplastic backing layer is selected from the group consisting of polyvinyl chloride, thermoplastic olefins, polycarbonates, acrylonitrile-butadiene-styrene copolymers, polystyrene, polyamide polymers, polyethylene, polypropylene, and copolymers, blends, and alloys including these polymeric compositions.

15           37. A metallized laminate according to Claim 35, wherein the metallized laminate incorporates a component selected from the group consisting of a tinted clear coat film, a tinted adhesive layer, and a tinted thermoplastic backing layer.

20           38. A metallized laminate according to Claim 1, further comprising an adhesive layer contiguously positioned on said second discontinuous metal layer, opposite said first discontinuous metal layer.



39. A metallized laminate according to Claim 38,  
further comprising a thermoplastic backing layer  
contiguously positioned on said adhesive layer, opposite  
said second discontinuous metal layer, wherein said  
5 adhesive layer comprises polyurethane and said  
thermoplastic backing layer is selected from the group  
consisting of polyvinyl chloride and acrylonitrile-  
butadiene-styrene copolymers.

10 40. A metallized laminate according to Claim 38,  
further comprising a thermoplastic backing layer; and  
wherein said adhesive layer comprises a polyurethane  
layer and an acrylic layer, said polyurethane layer of  
said adhesive layer being contiguously positioned between  
15 said second discontinuous metal layer and said acrylic  
layer of said adhesive layer; and

wherein said thermoplastic backing layer comprises  
an acrylonitrile-butadiene-styrene copolymer layer  
contiguously positioned on said acrylic layer of said  
20 adhesive layer.

41. A metallized laminate according to Claim 38,  
further comprising a thermoplastic backing layer; and

25 wherein said adhesive layer comprises a polyurethane  
layer, an acrylic layer, and a chlorinated polyolefin  
layer, said polyurethane layer being contiguously  
positioned between said second discontinuous metal layer  
and said acrylic layer, and said acrylic layer being

contiguously positioned between said polyurethane layer and said chlorinated polyolefin layer; and

wherein said thermoplastic backing layer comprises a thermoplastic olefin layer contiguously positioned on  
5 said chlorinated polyolefin layer of said adhesive layer.

42. A metallized laminate according to Claim 38, further comprising a thermoplastic backing layer;

wherein said adhesive layer comprises an  
10 acrylic/polyurethane layer and a chlorinated polyolefin layer, said acrylic/polyurethane layer being contiguously positioned between said second discontinuous metal layer and said chlorinated polyolefin layer; and

wherein said thermoplastic backing layer comprises a  
15 thermoplastic olefin layer contiguously positioned on said chlorinated polyolefin layer of said adhesive layer.

43. A metallized laminate according to Claim 1,  
20 further comprising at least one additional formable clear coat film positioned on said formable clear coat film, opposite said first discontinuous metal layer.

44. A metallized laminate according to Claim 1,  
25 further comprising an extensible mask layer on the surface of said formable clear coat film opposite said first discontinuous metal layer.

45. A metallized laminate according to Claim 1, further comprising a thermoplastic leveling layer that is positioned between said formable clear coat film and said first discontinuous metal layer.

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46. A metallized laminate according to Claim 45, wherein said thermoplastic leveling layer comprises polyvinyl fluoride and said formable clear coat film comprises polyvinylidene difluoride.

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47. A metallized laminate according to Claim 45, further comprising a thermoplastic primer layer positioned between said formable clear coat film and said leveling layer.

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48. A part formed from the formable metallized laminate of Claim 1.

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49. A part according to Claim 48 that has been formed using a technique selected from the group consisting of injection molding, blow molding, compression molding, thermoforming, vacuum forming, in-mold forming, and extrusion lamination.

50. A formable, bright metallized laminate,  
comprising:

a formable polymeric clear coat film;

a first discontinuous layer of metal islands  
5 deposited on said clear coat film; and

a second discontinuous layer of metal islands,  
wherein said first discontinuous layer of metal islands  
is positioned between said clear coat film and said  
second discontinuous layer of metal islands;

10 wherein said first discontinuous metal layer has a  
first surface that is contiguous to said formable clear  
coat film, and a second surface that is contiguous to  
said second discontinuous metal layer, wherein said  
15 second surface of said first metal layer includes a  
microscopic transitional sub-layer.

51. A metallized laminate according to Claim 50,  
wherein said microscopic transitional sub-layer is a  
plasma-treated sub-layer.

20 52. A metallized laminate according to Claim 50,  
wherein said microscopic transitional sub-layer is a  
deposited metal oxide sub-layer.

25 53. A metallized laminate according to Claim 50,  
wherein said second discontinuous metal layer comprises  
metal islands having an average width of less than about  
200 nm.

54. A metallized laminate according to Claim 50,  
wherein said second discontinuous metal layer comprises  
metal islands having an average width of less than about  
100 nm.

55. A metallized laminate according to Claim 50,  
wherein said formable clear coat film is a polymeric  
composition selected from the group consisting of  
fluoropolymers, acrylic polymers, polyurethanes,  
ionomers, polycarbonates, polyolefins, PEG-modified  
polyesters, polyamide polymers, and copolymers, blends,  
and alloys that include these polymeric compositions.

56. A metallized laminate according to Claim 50,  
wherein said first discontinuous metal layer and said  
second discontinuous metal layer are selected from the  
group consisting of aluminum, cadmium, cobalt, copper,  
chromium, gallium, gold, indium, iron, nichrome, nickel,  
palladium, platinum, rhodium, stainless steel, tin, zinc,  
and alloys and blends containing these metals.

57. A metallized laminate according to Claim 50,  
further comprising an additional formable clear coat film  
positioned on said formable clear coat film, opposite  
said first discontinuous metal layer.

58. A metallized laminate according to Claim 50, further comprising an adhesive layer placed on said second discontinuous metal layer, opposite said first discontinuous metal layer.

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59. A metallized laminate according to Claim 58, further comprising a thermoplastic backing layer placed on said adhesive layer.

10 60. A part formed from the metallized laminate of Claim 50.

61. A formable, bright metallized laminate, comprising:

15 a formable clear coat film; and  
a plurality of discontinuous metal island layers deposited on said clear coat film, said plurality of discontinuous metal island layers comprising a first outer discontinuous layer of metal islands that is  
20 deposited on said clear coat film, a second outer discontinuous layer of metal islands, and at least one inner discontinuous layer of metal islands positioned between said first and second outer discontinuous metal layers.

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62. A metallized laminate according to Claim 61, wherein said formable clear coat film comprises polyvinyl fluoride.

63. A metallized laminate according to Claim 61, wherein said formable clear coat film comprises polyvinylidene difluoride.

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64. A metallized laminate according to Claim 61, wherein said formable clear coat film is a polymeric composition selected from the group consisting of fluoropolymers, acrylic polymers, polyurethanes, ionomers, polycarbonates, polyolefins, PEG-modified polyesters, polyamide polymers, and copolymers, blends, and alloys including these polymeric compositions.

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65. A metallized laminate according to Claim 61, wherein said formable clear coat film comprises between about 10 and 70 weight percent of an acrylic polymer and between about 30 and 90 weight percent of fluoropolymer.

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66. A metallized laminate according to Claim 61, wherein at least one said discontinuous metal layer is selected from the group consisting of aluminum, cadmium, cobalt, copper, chromium, gallium, gold, indium, iron, nichrome, nickel, palladium, platinum, rhodium, stainless steel, tin, zinc, and alloys and blends containing these metals.

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67. A metallized laminate according to Claim 61,  
further comprising a thermoplastic leveling layer that is  
positioned between said formable clear coat film and said  
first outer discontinuous layer, wherein said  
5 thermoplastic leveling layer comprises polyvinyl fluoride  
and said formable clear coat film comprises  
polyvinylidene difluoride.

68. A metallized laminate according to Claim 61,  
10 wherein said plurality of discontinuous metal island  
layers is contiguous.

69. A metallized laminate according to Claim 68,  
wherein:

15 said first outer discontinuous metal layer and each  
said inner discontinuous metal layer have a first surface  
that is nearer the formable clear coat film and a second  
surface that is opposite the formable clear coat film;  
and

20 each said second surface comprises a microscopic  
transitional sub-layer.

70. A metallized laminate according to Claim 69,  
wherein each said microscopic transitional sub-layer is  
25 selected from the group consisting of a plasma-treated  
sub-layer and a deposited metal oxide sub-layer.



71. A metallized laminate according to Claim 61, wherein said second outer discontinuous metal layer comprises metal islands having an average width of less than about 400 nm.

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72. A metallized laminate according to Claim 61, wherein said second outer discontinuous metal layer comprises metal islands having an average width of less than about 200 nm.

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73. A metallized laminate according to Claim 61, wherein said second outer discontinuous metal layer comprises metal islands having an average width of less than about 100 nm.

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74. A metallized laminate according to Claim 61, further comprising an adhesive layer positioned on said second outer discontinuous metal layer, opposite said formable clear coat film.

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75. A metallized laminate according to Claim 74, wherein said adhesive layer is selected from the group consisting of pressure-sensitive adhesives, heat-reactive adhesives, crosslinking adhesives, and multicomponent adhesives.

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76. A metallized laminate according to Claim 74, wherein said adhesive layer comprises polyurethane.

77. A metallized laminate according to Claim 74, wherein said adhesive layer comprises acrylic.

5           78. A metallized laminate according to Claim 74, further comprising a thermoplastic backing layer placed on said adhesive layer, wherein said backing layer is selected from the group consisting of polyvinyl chloride, thermoplastic olefins, polycarbonates, acrylonitrile-  
10 butadiene-styrene copolymers, polystyrene, polyamide polymers, polyethylene, polypropylene, and copolymers, blends, and alloys including these polymeric compositions.

15           79. A metallized laminate according to Claim 78, wherein the metallized laminate incorporates a component selected from the group consisting of a tinted clear coat film, a tinted adhesive layer, and a tinted thermoplastic backing layer.

20           80. A metallized laminate according to Claim 61, further comprising at least one additional formable clear coat film positioned on said formable clear coat film, opposite said first outer discontinuous metal layer.

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81. A metallized laminate according to Claim 61, further comprising an extensible mask layer on the surface of said formable clear coat film, opposite said first outer discontinuous metal layer.

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82. A part formed from the formable metallized laminate of Claim 61.

83. A method for making a formable, bright metallized laminate, comprising:

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depositing a first discontinuous layer of metal islands upon a formable clear coat film; and

depositing a second discontinuous layer of metal islands onto the first discontinuous layer of metal islands.

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84. A method according to Claim 83, wherein the step of depositing a first discontinuous metal layer upon the formable clear coat film further comprises bonding the first discontinuous metal layer to the formable clear coat film at an adhesion strength of at least about two pounds per inch.

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85. A method according to Claim 83, wherein the step of depositing a first discontinuous metal layer upon the formable clear coat film further comprises plasma treating the first discontinuous metal layer to form a microscopic transitional sub-layer.

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86. A method according to Claim 83, further comprising depositing a microscopic metal oxide transitional sub-layer after the step of depositing a first discontinuous layer of metal islands and before the step of depositing a second discontinuous layer of metal islands.

87. A method according to Claim 83, further comprising press polishing the formable clear coat film.

88. A method according to Claim 83, wherein the step of depositing a first discontinuous layer of metal islands upon a formable clear coat film comprises depositing a first discontinuous layer of metal islands upon a microscopically-smooth surface of a formable clear coat film.

89. A method according to Claim 83, wherein the step of depositing a first discontinuous metal layer upon the formable clear coat film and the step of depositing a second discontinuous metal layer upon the first discontinuous metal comprise depositing a discontinuous layer of metal islands selected from the group consisting of aluminum, cadmium, cobalt, copper, chromium, gallium, gold, indium, iron, nichrome, nickel, palladium, platinum, rhodium, stainless steel, tin, zinc, and alloys and blends containing these metals.

90. A method according to Claim 83, wherein the step of depositing a first discontinuous layer of metal islands upon a formable clear coat film comprises depositing a first discontinuous layer of metal islands upon a formable clear coat film selected from the group consisting of fluoropolymers, acrylic polymers, polyurethanes, ionomers, polycarbonates, polyolefins, PEG-modified polyesters, polyamide polymers, and copolymers, blends, and alloys including these polymeric compositions.

91. A method according to Claim 83, wherein the step of depositing a first discontinuous layer of metal islands upon a formable clear coat film comprises depositing a first discontinuous layer of metal islands upon a formable film comprising polyvinyl fluoride.

92. A method according to Claim 83, wherein the step of depositing a first discontinuous layer of metal islands upon a formable clear coat film comprises depositing a first discontinuous layer of metal islands upon a formable film comprising polyvinylidene difluoride.

93. A method according to Claim 92, further comprising press polishing the formable polyvinylidene difluoride film.

94. A method according to Claim 83, further comprising placing an adhesive layer on the second discontinuous metal layer, opposite the clear coat film.

5           95. A method according to Claim 94, wherein the step placing an adhesive layer on the second discontinuous metal layer comprises coating the surface of the second discontinuous metal layer with an adhesive selected from the group consisting of pressure-sensitive  
10 adhesives, heat-reactive adhesives, crosslinking adhesives, and multicomponent adhesives.

          96. A method according to Claim 94, wherein the step of placing an adhesive layer on the second  
15 discontinuous metal layer comprises coating onto the surface of the second discontinuous metal layer an adhesive selected from the group consisting of polyurethane adhesives and acrylic adhesives.

20           97. A method according to Claim 94, further comprising bonding a thermoplastic backing layer to the adhesive layer.

25           98. A method according to Claim 97, wherein the step of bonding a thermoplastic backing layer to the adhesive layer comprises bonding a thermoplastic backing layer selected from the group consisting of polyvinyl chloride, thermoplastic olefins, acrylonitrile-butadiene-styrene copolymers, polycarbonates, polystyrene,

polyamide polymers, polyethylene, polypropylene, and copolymers, blends, and alloys including these polymeric compositions.

5            99. A method according to Claim 83, further comprising placing an extensible mask layer onto the formable clear coat film, opposite the first discontinuous metal layer.

10           100. A method according to Claim 83, further comprising depositing at least one additional discontinuous layer of metal islands between the first discontinuous metal layer and the second discontinuous metal layer.

15           101. A method according to Claim 83, further comprising depositing an additional clear coat on the formable clear coat film.

102. A method for making a formable, bright metallized laminate, comprising:

depositing a plurality of contiguous, discontinuous layers of metal islands upon a clear coat film; and

5 surface treating each discontinuous layer of metal islands to form a microscopic transitional sub-layer before depositing an additional contiguous, discontinuous layer of metal islands.

10 103. A method according to Claim 102, wherein the step of surface treating each discontinuous layer of metal islands comprises plasma treating each discontinuous layer of metal islands.

15 104. A method according to Claim 102, wherein the step of surface treating each discontinuous layer of metal islands comprises depositing a microscopic metal oxide transitional sub-layer onto each discontinuous layer of metal islands.

20 105. A method according to Claim 102, wherein the step of depositing a plurality of contiguous, discontinuous layers of metal islands upon a clear coat film comprises depositing a plurality of discontinuous  
25 layers of metal islands selected from the group consisting of aluminum, cadmium, cobalt, copper, chromium, gallium, gold, indium, iron, nichrome, nickel, palladium, platinum, rhodium, stainless steel, tin, zinc, and alloys and blends containing these metals.



106. A method according to Claim 102, wherein the  
step of depositing a plurality of contiguous,  
discontinuous layers of metal islands upon a clear coat  
5 film comprises depositing a first discontinuous layer of  
metal islands upon a microscopically-smooth surface of a  
formable, clear coat film

107. A method according to Claim 102, wherein the  
10 step of depositing a plurality of contiguous,  
discontinuous layers of metal islands upon a clear coat  
film comprises depositing a first discontinuous layer of  
metal islands upon a formable film comprising polyvinyl  
fluoride.

15 108. A method according to Claim 102, wherein the  
step of depositing a plurality of contiguous,  
discontinuous layers of metal islands upon a clear coat  
film comprises depositing a first discontinuous layer of  
20 metal islands upon a formable film comprising  
polyvinylidene difluoride.